

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
5 December 2002 (05.12.2002)

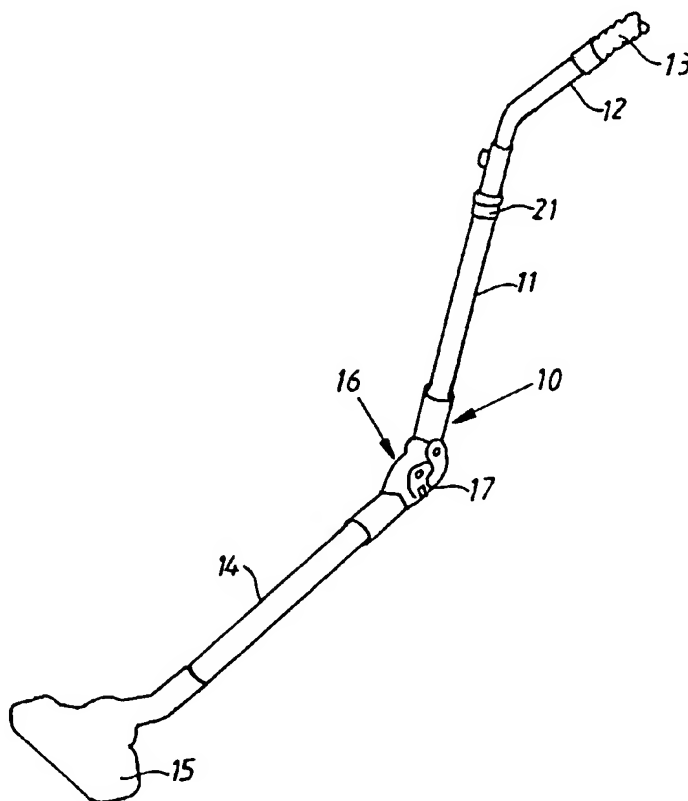
PCT

(10) International Publication Number  
**WO 02/096258 A1**

- (51) International Patent Classification<sup>7</sup>: **A47L 9/24** (74) Agent: SCHMERER, Sven, Erik; AB Electrolux (publ.), Group Intellectual Property, S-105 45 Stockholm (SE).
- (21) International Application Number: PCT/SE02/00949
- (22) International Filing Date: 17 May 2002 (17.05.2002)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
0101924-9 31 May 2001 (31.05.2001) SE
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- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW.
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: TUBE SHAFT FOR A VACUUM CLEANER



(57) Abstract: A tube shaft for a vacuum cleaner comprising upper and lower tube-shaped parts (11, 14) which by way of a link means (16) are pivotally connected to one another. The link means (16) is provided with a locking mechanism for locking the two tube-shaped parts in one or several angular positions with respect to one another. The tube shaft comprises an operating means (21) arranged at a distance from and above said link means (16). The operating means (21) is connectable to the locking mechanism for activating or deactivating the locking means.

WO 02/096258 A1



**Published:**

— with international search report

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

## TUBE SHAFT FOR A VACUUM CLEANER

This invention relates to a tube shaft for a vacuum cleaner, the tube shaft comprising at least one upper and a lower tube-shaped part which via a link means  
5 are pivotally connected to one another, the link means being provided with a locking mechanism for locking the two tube-shaped parts in one or several angular positions with respect to one another.

Conventional tube shafts for vacuum cleaners comprise several tube-shaped elements that can be connected to one another to form a communication  
10 between a nozzle and a tube handle by which a hose is connected to the vacuum cleaner housing. It is also previously known to use telescopic tube shafts for which the length of the tube shaft can easily be adapted to the height of the operator by pulling out a suitable length of an inner tube from an outer tube before the elements are locked with respect to one another.

15 To achieve improved ergonomic conditions during the vacuum cleaning operation it has also been proposed to use tube shafts that are provided with a link means for increasing the accessibility below low details while maintaining the working position as well as telescopic tube shafts of the same type, see SE 9802315-3 and US 5927758.

20 A drawback of the last-mentioned types of tube shafts is that the link means with its adjustment mechanism is placed somewhat down at the tube shaft. Thus, the operator has to change his position either by bending down in order to reach the adjustment mechanism or by raising the tube shaft and nozzle.

The purpose of the present invention is to create a device that facilitates  
25 said adjusting operation which can be made with a preserved working position. This is achieved by means of a device having the characteristics mentioned in the claims.

An embodiment of the invention will now be described with reference to the accompanying drawing on which

30 Fig. 1 shows a perspective view of a tube shaft according to the invention;

Fig. 2 is an axial section through the tube shaft of Fig. 1 with link means, the tube parts and the locking mechanism being shown in a first position;

Fig. 3 is an axial section through the tube shaft of Fig. 1 with link means, the tube parts and the locking mechanism being shown in a second position;

Fig. 4 is an axial section through the tube shaft of Fig. 1 with link means, the tube parts and the locking mechanism being shown in a third position;

5 Fig. 5 is an axial section through the tube shaft of Fig. 1 with link means, the tube parts and the locking mechanism being shown in a fourth position; and

Fig. 6 is an axial section through the tube shaft of Fig. 1 with link means, the tube parts and the locking mechanism being shown in a fifth position.

The present invention provides a device that facilitates the above-mentioned adjusting operation without the user changing positions or raising the  
10 tube shaft and nozzle.

Fig. 1 shows a tube shaft 10 having an upper tube-shaped part 11 connected to a tube handle 12. The tube handle 12 is connected, by means of a hose 13, to a vacuum cleaner housing (not shown) being provided with a vacuum  
15 source (not shown). The lower tube-shaped part 14 is connected to a conventional nozzle 15 by which dust laden air is sucked up into the tube shaft 10. The tube shaft 10 has a link means 16 placed between the upper tube-shaped part 11 and the lower tube-shaped part 14. Further, the tube shaft 10 has a locking mechanism 17. By means of the link means 16 and the locking mechanism 17, the two tube-  
20 shaped parts 11, 14 can be pivoted and locked with respect to one another.

The upper tube-shaped part 11 comprises a thin wall tube, for instance of aluminium, which at its upper end is provided with a socket for the tube shaft 12. The lower end of the upper tube-shaped part 11 is provided with a seal 18 which in the position shown in Fig. 2 abuts the inner surface of the thin wall tube 14  
25 which preferably is made of aluminium and which constitutes the lower tube-shaped part 14. The two tube-shaped parts 11, 14 are made such that the upper tube-shaped part 11 can be inserted telescopically into the lower tube-shaped part 14. The upper tube-shaped part 11 is provided with an axially directed, outwardly open groove 19 that partly surrounds a draw bar 20. As shown in Figs.  
30 1 and 6, the upper part of the draw bar 20 is connected to a sleeve 21 surrounding the upper tube-shaped part 11. The draw bar 20 and sleeve 21 are arranged to be moved a limited distance in the axial direction,  $a$ , of the tube-shaped part 11. As shown in Fig. 2, the lower part of the draw bar 20 is provided with a hook 22

constituting a part of the locking mechanism 17 and whose function is described below.

The lower tube-shaped part 14 is supported by a first link member 23 of the link means 16. The upper tube-shaped part 11 is slidably arranged within a second link member 24. The two link portions are pivotally arranged with respect to one another about an axle or pin 25 which is located outside the two tube-shaped parts 11,14. The two link members 23,24 may be made of plastic.

The first link member 23 is provided with a tube-shaped connection part 26 having the same inner diameter as the outer diameter of the lower tube-shaped part 14 and being a linear extension of it. The upper end of the first link member 23 is obliquely terminated with respect to the axial direction,  $a_1$ , of the lower tube-shaped part 14 and is partly shaped as a shell 27 curved in two directions and having an inner surface 28 forming a sealing surface for the lower end of the second link member 24.

The second link member 24 is also obliquely terminated with respect to the axial direction,  $a_2$ , of the upper tube-shaped part 11. The second link member 24 comprises a tube-shaped connecting part 29 within which the upper tube-shaped part 11 is telescopically movable.

The second link member 24 also has a locking mechanism, not shown, by means of which the upper tube-shaped part 11 can be locked in different axial positions in a telescoping fashion with respect to the link members 23, 24 and the lower tube-shaped part 14.

The connecting parts 26, 29 are respectively provided with link portions 30, 31 supporting the pin 25. The second link member 24 is also provided with one or more latches 32 pivotally arranged about a shaft 33 on the outside of the second link member 24 and being fixedly connected to an operating arm 34. The operating arm 34 is connected to a spring loaded control knob 35 which is movably arranged in the axial direction,  $a_2$ , of the upper tube-shaped part 11. The operating knob 35 is provided with an abutment surface 36 cooperating with the hook 22 in a way which will be described below.

The first link member 23 is firmly secured to one or more cam members 37. The cam members 37 are roughly pie-shaped and are supported for

pivoting motion about the pin 25. Further, the cam members 37 are provided with a cam surface having several recesses 38 cooperating with the latch 32.

The tube shaft 10 operates in the following manner. Fig. 2 shows the upper tube-shaped part 11 partly inserted into the lower tube-shaped part 14, and the two connecting parts 26 and 29 of the two link members 23, 24 being in line with one another. When the upper tube-shaped part 11 is pulled out from the lower tube-shaped part 14 (see Fig. 3), the hook 22 of the draw bar 20 will engage the abutting surface 36 at the same time as the link portions 30, 31 are no longer blocked since the upper tube-shaped part 11 is not longer inserted through the link members 23, 24. In this position the operator can now pull the sleeve 21 upwards to the position shown in Fig. 1, causing the draw bar 20 to move the hook 22 which lifts the operating knob 35 upwards against the spring forces such that the latch 32 comes free from the cam member 37, see Fig. 4. Thus, the upper and the lower part 11, 14 can now be pivoted to the position shown in Figs. 1 and 5, after which the operator releases the sleeve 21 so that the latch 32 comes into engagement with a suitable recess 38 to lock the parts 11 and 14 in this position (see Fig. 5).

## Claims

1. A tube shaft for a vacuum cleaner comprising an upper tube-shaped part (11);  
5 a lower tube-shaped part (14); a link means (16) pivotally connecting the lower tube-shaped part (14) to the upper tube-shaped part (11), the link means (16) being provided with a locking mechanism (32,37) for locking the two tube-shaped parts in one or several angular positions with respect to one another, **characterized in** that there is an operating means (21) arranged at a  
10 distance from and above said link means (16), the operating means (21) being connected to the locking mechanism (32,37) for activating or deactivating the locking means.
2. The tube shaft according to claim 1 **characterized in** that the operating means  
15 is connected to the locking mechanism (32,37) by one of a wire, a draw bar and a push rod (20).
3. The tube shaft according to claim 1 or 2, **characterized in** that the operating  
20 means (21) comprises a sleeve surrounding the upper tube-shaped part (11).
4. The tube shaft according to any of the preceding claims, **characterized in** that the locking mechanism comprises a spring loaded latch means (32) for engaging a recesses (38) on a cam surface, the latch following a pivoting motion of one of the upper tube-shaped part and the lower tube-shaped part,  
25 and the cam surface following a pivoting motion of the other one of the upper tube-shaped part and the lower tube-shaped part.
5. The tube shaft according to claim 2, **characterized in** that said one of the wire, the draw bar and the push rod is arranged in a groove (22) on the outside  
30 of the upper tube-shaped part (11).
6. The tube shaft according to any of the preceding claims, **characterized in** that at least one of the upper tube-shaped part (11) and the lower tube-shaped part

(14) is movable telescopically through the link means (16) when the upper tube-shaped part (11) is aligned with the lower tube-shaped part (14).

7. The tube shaft according to any of the preceding claims, **characterized in** that  
5 the link means (16) comprises a first link member (23) and a second link member (24), the first link member (23) having a first tube-shaped connecting part (26) for the lower tube-shaped part (14) and the second link member (24) having a second tube-shaped connecting part (29) for the upper tube-shaped part (11), the first link member (23) being pivotally connected to the second  
10 link member (24) at an axis (25) located outside the periphery of the upper tube-shaped part and the lower tube-shaped part.
8. The tube shaft according to claim 7, **characterized in** that the first link member (23) and the second link member (24) are provided with a sealing  
15 surface (28) during a pivoting motion.
9. The tube shaft according to claim 1, **characterized in** that the operating means (21) is located at an upper portion of the upper tube-shaped part (11).
- 20 10. The tube shaft according to claim 6, **characterized in** that the operating means (21) is in a connectable position when the tube-shaped parts (11,14) are in said angular positions.



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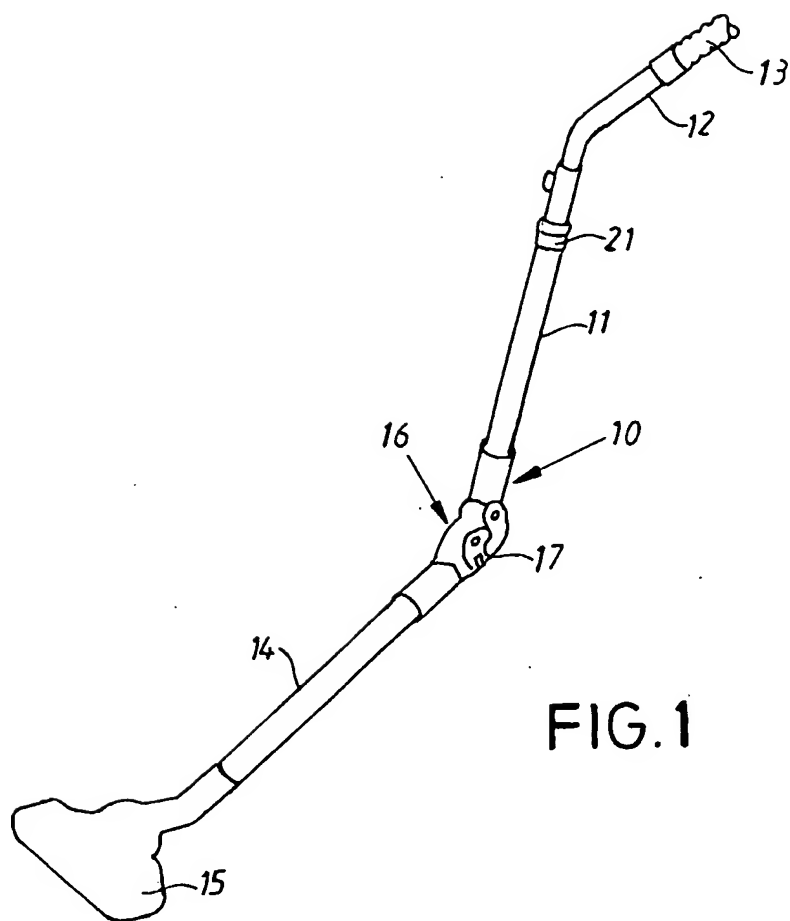


FIG. 1

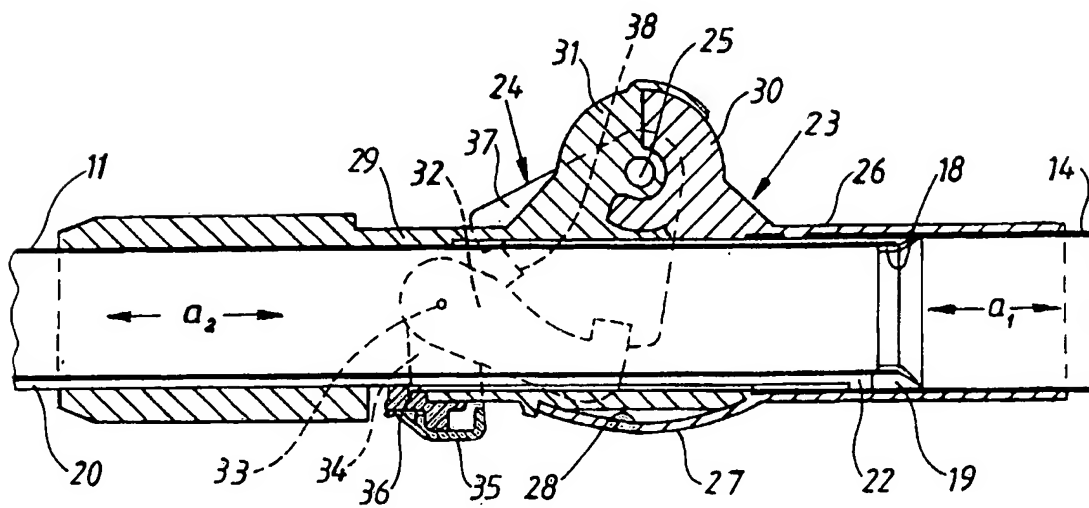


FIG. 2

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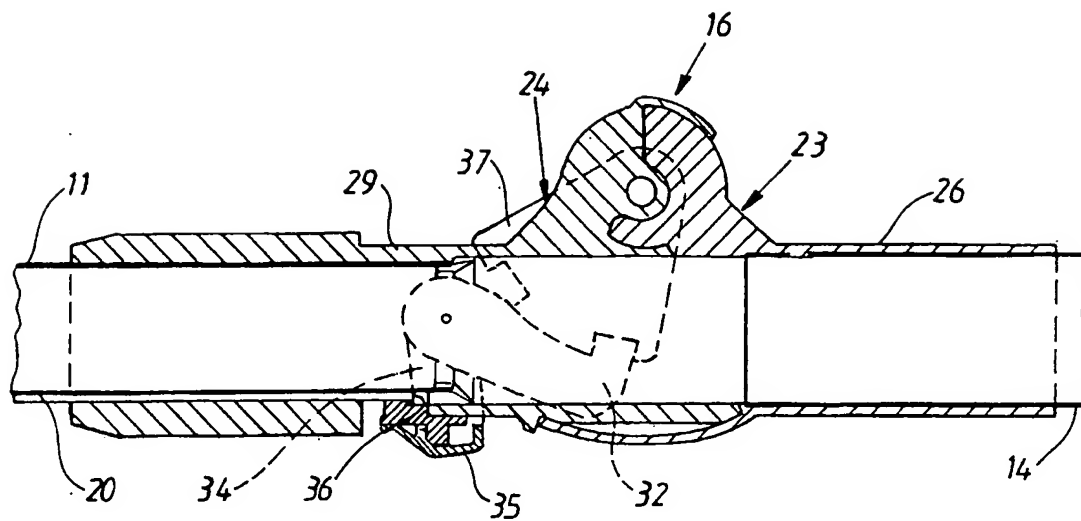


FIG. 3

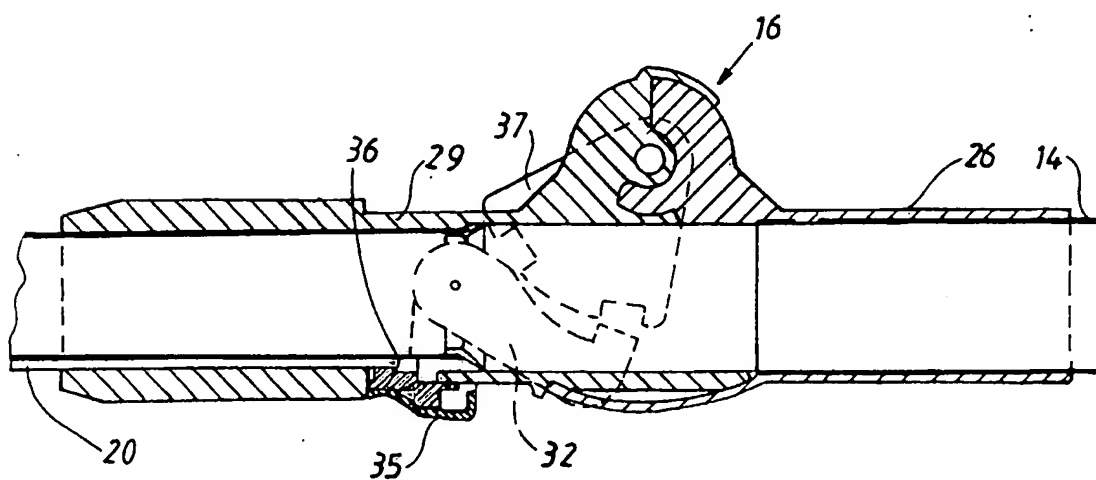


FIG. 4

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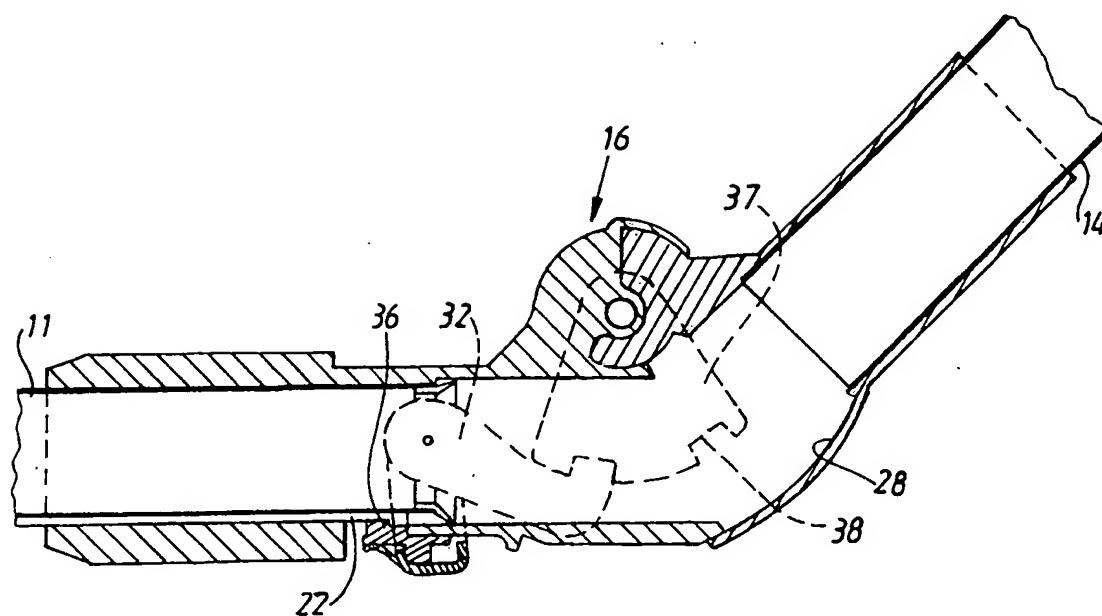


FIG. 5

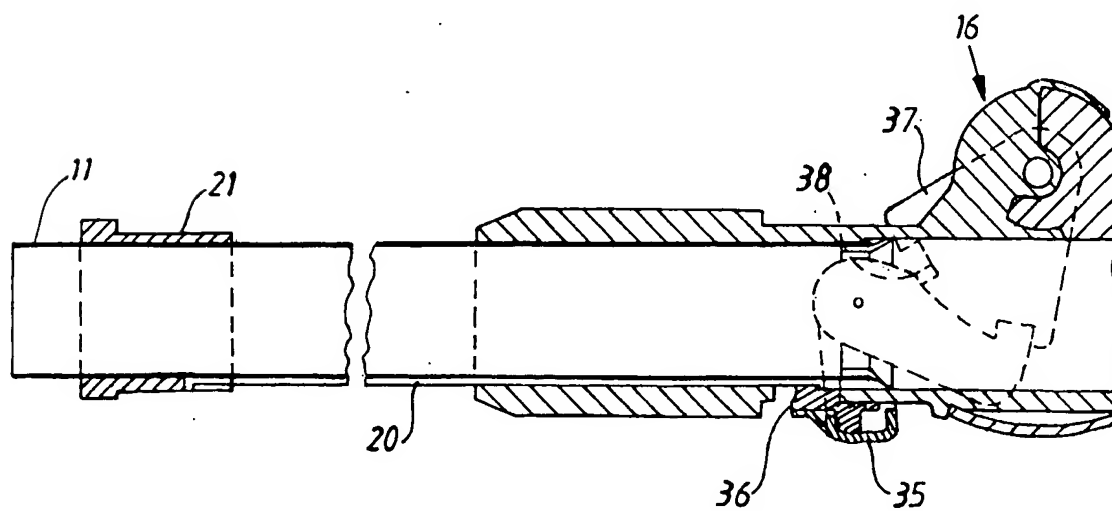


FIG. 6

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 02/00949

## A. CLASSIFICATION OF SUBJECT MATTER

IPC7: A47L 9/24

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: A47L, F16L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5927758 A (CARLSSON), 27 July 1999 (27.07.99), figures 1-6, abstract --	1-10
A	SE 9802315-3 L (DICK LARSSON), 30 December 1999 (30.12.99), figures 2,3 -- -----	1-10

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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Date of the actual completion of the international search

18 July 2002

Date of mailing of the international search report

29-07-2002

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

06/07/02

International application No.

PCT/SE 02/00949

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